tory, 1899, presented by the Editors; *American Nautical Almanac* papers, vol. vi., part 4 (Newcomb, Tables of *Mars*), presented by the *American Nautical Almanac* Office; and a series of solar photographs (original negatives), presented by G. J. Newbegin.

The Division Errors of the Greenwich Transit Circle and some questions related to Them. By F. W. Dyson and W. G. Thackeray.

[*Abstract.*]

In this paper an account is given of a new determination of the division errors of the Greenwich Transit Circle, made in 1898, with a view to explaining the discordances in the circumpolar observations as given by the Astronomer Royal in his report to the Board of Visitors in 1898 June. As the Greenwich Transit Circle is ordinarily read by six equidistant microscopes, the determination of the division errors consists in the subdivision of an arc of 60°. This is first divided into three parts, and the arcs of 20° subdivided into the arcs of 5°, and then the 5° arcs subdivided into single degrees. The first determination was made in 1851, taking 0°, 20°, 40° as the primary divisions. This was repeated in 1856. In 1871 a new determination was made, taking 10°, 30°, 50° as the primary divisions. In 1898 two determinations were made, taking 5°, 25°, 45°, and 15°, 35°, 55° as the primary divisions. The final result of the errors of the 5° divisions was obtained from the mean of the determinations in 1856, 1871, and the two determinations in 1898. A further determination of the single degree divisions was made, and of the 5′ divisions used in the observations of the close polar stars. Tables are given of the new division errors, and of corrections to those in use in the different years since 1851.

The corrections thus determined to the division errors in use are applied to—

(1) The residuals in the R—D discordance.
(2) The differences between the N.P.D.'s obtained from observations made above and below pole at Greenwich given in the Introduction to the 1880 Catalogue.
(3) The differences between the Greenwich and Cape N.P.D.'s, as given in the Introduction to the Cape 1885 Catalogue.
(4) The Greenwich Sun observations.

The following table, derived from the Introduction to the Greenwich Catalogue for 1880 by grouping the stars in zones of 3°, gives the excess of the N.P.D. from observations made above pole :—

Mean N.P.D. of Group.	Excess of N.P.D. above Pole. Old Division Errors.	New Division Errors.	Weight.
°	″	″	
2·3	−0·47	−0·22	20
5·4	− ·16	− ·15	21
8·5	− ·02	− ·02	36
10·9	− ·18	− ·12	29
13·8	+ ·25	+ ·16	47
17·0	+ ·17	− ·07	40
19·7	+ ·19	− ·05	54
22·6	+ ·19	+ ·10	64
25·3	− ·05	+ ·05	68
28·4	− ·22	− ·02	78
31·5	− ·66	− ·46	37
34·5	− ·25	− ·15	25
38·4	− ·44	− ·59	21

It will be seen that the well-known discordance of the close polars from those at about 20° N.P.D., though not entirely removed, is largely diminished.

The discussion of the Greenwich and Cape observations given in the Introduction to the Cape Catalogue for 1885 was repeated in part, and a very satisfactory reduction of the discordances resulted. Dr. Gill found that whereas the probable error of an observation is about $\pm 0''\cdot 50$, yet the residuals of his equations (when solved on different suppositions as to the refraction and R−D discordance) corresponded to probable errors of $\pm 1''\cdot 57$, $\pm 1''\cdot 49$, $\pm 1''\cdot 60$, $\pm 1''\cdot 46$. The new division errors reduce these quantities to $\pm 0''\cdot 90$, $\pm 0''\cdot 75$, $\pm 1''\cdot 10$, $\pm 0''\cdot 73$. In view of the large reduction in these quantities, especially the 2nd and 4th, where the Cape observations are corrected for R−D discordances, it would appear that division error, and not irregular heating of the observing room, is the cause.

The question of refraction and R−D is briefly discussed in a similar way to that given in the Cape Catalogue for 1885, using the figures given by Dr. Gill, but correcting them for division error and for an important numerical error which was made early in the discussion. It appears from this that no definite conclusion can be drawn as to the correctness of applying an R−D discordance to the Cape observations.

Corrections to the division errors are also applied to the results of the Greenwich Sun observations.

The refraction most suitable to the Greenwich observations is discussed briefly. The conclusions arrived at on this oft-discussed topic are :—

(1) That the refractions of the Tabulæ Regiomontanæ satisfy

the Greenwich circumpolar observations down to 75° Z.D., as well as those of the Pulkova Tables.

(2) That accordance between the Cape and Greenwich N.P.D.'s would be secured by the Pulkova Tables.

(3) The Greenwich Sun observations require the refractions of the Tabulæ Regiomontanæ.

Note on Pogson's Manuscripts, relating to his proposed "Atlas of Variable Stars." By J. G. Hagen, S.J.

(*Communicated by the Secretaries.*)

During the astronomical congress held this summer (1898) at the Harvard College Observatory, the writer was kindly permitted to examine the manuscripts of the late N. R. Pogson, which are preserved in a fireproof building of that observatory.* The readers of the *Notices* are aware, at least in a general way, of Pogson's plans from a report in vol. xx. p. 143, and of the unfinished state of his work from the Obituary in vol. lii. p. 235. The following note is intended to give in outline the character and progress of his work as far as they are shown by the manuscript itself. From the Obituary we only recall that Pogson carried on his work in three different places—namely, at the Radcliffe Observatory from 1851 to 1858, at the Hartwell Observatory from 1859 to 1860, and in Madras from 1861 to 1891, the year of his death.

The best knowledge of Pogson's work on his proposed Atlas would of course be obtained from the publication of the list of all the finished catalogues and charts. Yet as this list is rather extensive, it seems better to give here only a summary statement.

The manuscripts consist of catalogues of star places and magnitudes, and of a few charts plotted by hand. There is no introduction to give information on the plan of the Atlas, the methods employed or the instruments used, yet the catalogues and charts, with a few interspersed notes, will give a pretty complete idea of Pogson's work.

* Inquiry was made of Father Hagen by the Secretaries, how the papers of Mr. Pogson came to be at Harvard College Observatory. In reply, Father Hagen kindly sent a letter from Professor Pickering, giving the following information:—

"The papers were sent to the Harvard College Observatory after correspondence with the family of Mr. Pogson, and especially with his sister, Mrs. Baxendell. I understood that her son expected to reduce Pogson's observations of variable stars, and I recommended that these maps and catalogues should be published in connection with them. I shall of course be glad to take any steps which will secure their publication. Meanwhile, like other extensive collections of observations deposited here, they are available for any use that can be made of them."